demand estimation of fresh sea fish with panel data model

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Abstract: The existence of seasonal change factor (arrest and famine) causes an inequilibrium between demand and supply of fresh sea fish in Indonesia. When the famine season causes the production of fish catches to decrease so that fish prices rise, while the other side of demand or consumption is relatively fixed or increased. Research conducted in Indonesia, especially South Sulawesi province aims to estimate the demand of fresh marine fish with selected fish species, *indian mackerel*, *sardinella longiceps*, and *scads mackerel*. The method used by econometric model of data panel with fixed effect method. Based on time dimension used time series data of 1991-2014 with combined data of 3 districts (Barru, Jeneponto, and Sinjai) in South Sulawesi Province. The results of the study found that in general the price of marine fish itself positively and negatively influenced significantly to the demand of fresh sea fish in South Sulawesi. This is because of the taste and preferences of the people of South Sulawesi. Income per capita has a positive effect because of the desire to consume sea fish so that demand always increases. Regional differences have positive and negative effects on the demand for fresh sea fish both in rural and urban areas. Another case the price of chicken eggs have no significant effect. This is because of the factors of consumption behavior and consumer attitudes and culture influence in the decision of the people of South Sulawesi to buy marine fishery products

Keywords: estimation demand, fresh sea fish, and panel data

1. INTRODUCTION

Fish is one of the most important sources of meat supply worldwide (Moses et al., 2015) because it contains not only essential fatty acids and proteins but also other nutrients (Feng et al., 2009) and contains omega-3 (Trondsen et al., 2004) with low cholesterol levels compared to red meat and easy to digest (Herath and Radampola, 2016) useful to reduce the risk of some diseases (Trondsen et al., 2004), so to fulfill those needs, It is necessary to intake 150 grams of fish to meet the needs of protein consumption of 50-60% for adults (Yilmaz et al 2016) making it beneficial to human health (Busova, 2013).

Fish consumption in Indonesia reaches 12.8 kg per capita per year of 16.4% of total protein consumed. The highest consumption rates range from 26.4 kg per capita per year in Maluku and the lowest to 4 kg per capita per year in Yogyakarta (FAO/Food Agriculture Organization, 2015). Although Indonesia is an archipelagic country with a large coastline but fish consumption is much smaller than in Asian countries such as Vietnam at 14.6 kg per capita per year, Myanmar 21 kg per capita per year, Thailand 31.4 kg per capita per year, Phillippines 40.2 kg per capita per year and Cambodia 63.2 kg per capita per year (FAO, 2015), United States 80 kg per capita, South Korea and Hongkong respectively 85 kg per capita per year, and Japan 110 Kg per capita per year (Vigantari et al. 2011). Community fish consumption in South Sulawesi is 60-80 kg per capita per year higher than the national consumption in Indonesia which is only 46 kg per capita (Hasanuddin, 2016).

Consumption of fish per capita can only be maintained or enhanced if global fish supply is relatively stable and stable (Merino et al., 2012). Per capita consumption of fish in the Asia Pacific region The highest in the Pacific

followed by Southeast Asia, South Asia and North Asia. However, although fish consumption in countries such as India and Pakistan is relatively low (2.85 and 0.6 kg per capita per year respectively) but large fish populations from these countries produce significant quantities of fish (FAO , 2015).

Globally, FAO said that there has been an increase in fishery production in the world, from 140 million tons in 2007 to 145 million tons in 2009 (FAO, 2011). This product is still the 'most traded food commodity' with a trade value of more than 102 million dollars, up 9% from 2007 (FAO, 2011; Virgantari et al. 2015). The growth of total fishery production in Indonesia during the period of 2002-2009 continued to increase, from 5.5 million tons in 2005 to 9.5 million tons in 2009. In the period 2002-2005 growth of about 6% per year, but the 2005-2009 growth reaches about 10% per year (Virgantari et al. 2015). The production of fresh marine fish catches in Indonesia, especially South Sulawesi Province on 2011-2015 is 249,524 tons (Statistik Perikanan Sulawesi Selatan, 2016). The high production of these catches illustrates the large amount of fish supply to meet domestic consumption, but has not been utilized from the increase in fish demand (Fauzi, 2005).

The existence of seasonal change factor (arrest and famine) causes an imbalance between demand and supply of fresh sea fish in South Sulawesi Indonesia. According Fauzi (2005) famine season causes the production of fish catches decreased so that the price of fish rose, while the other side of demand or consumption is relatively fixed or increased.

Demand for fresh sea fish is the number of fish requested at the price and income levels within a certain period (Setiadi and Irham, 2003; Abdusysyahid, 2006; Rahim, 2012). Changes in demand for fresh fish are influenced by the price of fish (Dalhatu and Ala, 2010; Vigantari et al, 2011), income (Nayga and Capps 1995, Leopold et al. 2004; Vigantari et al., 2011; Moses et al., 2015), Price of other products (Setiadi and Irham 2003; Kiziloðlu and Kizilaslan, 2016), availability of fish (Abdusysyahid, 2006), socio-economic fishing practices (Moses et al., 2015), consumer culture (Dey et al. 2008), characteristics of behavior and consumption habits (Erdogen et al., 2011), as well as demographics and attitudes in decision-making buy marine fish (Ahmed et al. 2011).

In theory, demand explains the behavior of consumers to meet their needs confronted by choice problems (Henderson and Quant, 1980; Jogiyanto, 2004), whereas demand functions can be derived from utility functions with constraint income (Henderson and Quant, 1980) or money (Jogiyanto, 2004) owned by the consumer faced by the problem of choice to obtain maximum satisfaction while the consumer has the income terbtas (Henderson and Quant, 1980). This function is known as the Marshallian request function name (Jogiyanto, 2004; Tasman and Aima, 2013, Rahim, 2016). The demand function is influenced by the price itself, the price of other goods, the level of income, the taste, and the population (Salvatore, 1996).

Furthermore, the findings of this model are certainly different from other research models, such as Vigantari et.al (2011) using the model of Almost Ideal Demand System (AIDS) and Kiziloðlu and Kizilaslan (2016) with Logit model. Basically the purpose of fisheries development is among others the increase of fish consumption in line with the awareness in improving the nutrition of the society in order to improve the quality of human resources in the implementation of fisheries development (Keputusan Menteri Kelautan dan Perikanan No.18/ Men/2002). Based on that, the purpose of this research is to estimate the demand of fresh sea fish with data panel model in Indonesia

2. STUDY AREA

South Sulawesi Province is located at 0 ° 12 '- 8 ° South Latitude and 116 ° 48' - 122 ° 36 'East Longitude (Biro Pusat Statistik Sulawesi Selatan, 2016). South Sulawesi is adjacent to West Sulawesi Province in the north of Toraja Utara District, Bone Bay, and Southeast Sulawesi province in the east in East Luwu regency, and border with Makassar Strait in the west and Flores Sea in the east. In addition, sea breeze rates of 5-20 knots and sea wave height between 0.75 and 2 meters with surface temperatures have fluctuated between 26°C and 32.4°C (Biro Pusat Statistik Sulawesi Selatan, 2016).

Land area of approximately 45,764.53 km^2 or 45,764,530 Ha inhabited by 8,032,551 people then the average population density of South Sulawesi Province is as much as 176 people / km^2. Of the land area used for the development of agriculture sector of 4.566 820 Ha (Biro Pusat Statistik Sulawesi Selatan, 2016). The number of regencies / cities in South Sulawesi is 23 districts, namely Tana Toraja, North Toraja, Bone, Gowa, Luwu, Makassar, Bulukumba, Maros, Jeneponto, Pangkep, Pinrang, Bantaeng, Enrekang, Wajo, Takalar, Luwu Utara, Sinjai, Sidrap , Selayar, Soppeng, Barru, Palopo, and Pare-Pare (Biro Pusat Statistik Sulawesi Selatan, 2016). The study area consists of 3 districts directly adjacent to the West Coast Coastal Area or Makassar Strait waters, namely Barru regency, South coast or Flores Sea, namely Jeneponto Regency, and east coast or Bone Bay of Sinjai District (Figure 1).

Figure. 1. Case Study Area: South Sulawesi Province, Indonesia

3. Material and Method

The type of research used is explanatory method (Singarimbun and Efendi, 1989) used to estimate the demand of fresh sea fish in South Sulawesi. The types of fish studied were small pelagic fish species (*indian mackerel*, *sardinella longiceps*, and *scads mackerel*) in each district, Barru, Jeneponto, and Sinjai of South Sulawesi between 1991-2014. Testing hypothesis estimation of factors influencing the demand of fresh sea fish at 3 (three) district of South Sulawesi with multiple linear regression with econometric model of data panel of fixed effect method as follows:

$$QdKmbng_{it} = \beta_0\ PKmbng_{it}^{\beta 1}\ PLmr_{it}^{\beta 2}\ PLyng_{it}^{\beta 3}\ PTA_{it}^{\beta 4}\ IPkpt_{it}^{\beta 5}\ DmWPKB_i^{\delta 1}\ DWPKJ_i^{\delta 2}\ \mu_{1it} \quad (1)$$

$$QdLmr_{it} = \beta_6\ PLmr_{it}^{\beta 7}\ PLyng_{it}^{\beta 8}\ PKmbng_{it}^{\beta 9}\ PTA_{it}^{\beta 10}\ IPkpt_{it}^{\beta 11}\ DmWPKB_i^{\delta 3}\ DWPKJ_i^{\delta 4}\ \mu_{2it} \quad (2)$$

$$QdLyng_{it} = \beta_{11}\ \beta_{12}\ PLyng_{it}^{\beta 13}\ PLmr_{it}^{\beta 14}\ PKmbng_{it}^{\beta 15}\ PTA_{it}^{\beta 16}\ IPkpt_{it}^{\beta 17}\ DmWPKB_i^{\delta 5}\ DWPKJ_i^{\delta 6}\ \mu_{3it} \quad (3)$$

To facilitate the calculation of equation models (1), (2) and (3) then the equation is converted into multiple linear with double log or natural logarithm (Ln) method as follows:

$$LnQdKmbng_{it} = \beta_0 + \beta_1 LnPKmbng_{it} + \beta_2 LnPLmr_{it} + \beta_3 LnPLyng_{it} + \beta_4 LnPTA_{it} + \beta_5 LnIPkpt_{it} + \delta_1 DmWPKB_i + \delta_2 DWPKJ_i + \mu_{1it} \quad (4)$$

$$LnQdLmr_{it} = \beta_6 + \beta_7 LnPLmr_{it} + \beta_8 LnPLyng_{it} + \beta_9 LnPKmbng_{it} + \beta_{10} LnPTA_{it} + \beta_{11} LnIPkpt_{it} + \delta_3 DmWPKB_i + \delta_4 DWPKJ_i + \mu_{2it} \quad (5)$$

$$LnQdLyng_{it} = \beta_{12} + \beta_{13} LnPLyng_{it} + \beta_{14} LnPLmr_{it} + \beta_{15} LnPKmbng_{it} + \beta_{16} LnPTA_{it} + \beta_{17} LnIPkpt_{it} + \delta_5 DmWPKB_i + \delta_6 DWPKJ_i + \mu_{3it} \quad (6)$$

Where :

QdKmbng: *indian mackerel* demand, year-t (kg)

QdLmr : *sardinella longiceps* demand, year-t (kg)

QdLyng: *scads mackerel* demand in, year t (kg)

β_0, β_6, and β_{12} : intercept

β_1, ..., β_5, β_7, ..., β_{11}, and β_{13}, ..., β_{17},: the independent variable regression coefficient

$\delta 1$, ..., $\delta 6$: regression coefficient of dummy variables

PKmbng : the price of real *indian mackerel*, year-t (Rp)

PLmr : the price of real *sardinella longiceps*, year -t (Rp)
Plyng : the price of reall *scads mackerel*, year-t (Rp)
PTA : the price of chicken eggs, year-t (Rp)
Ipkpt : income per capita, year-t (Rp)
DmWPKB: 1, for dummy of Barru District; and 0, for others
DmWPKJ: 1, for dummy of Jeneponto District; and 0, for others
$\mu_1, ..., \mu_3$: error disturbance
$_t$: time series (year)
$_i$: cross-section (district difference)

Furthermore, the equation model specifications (1), (2) and (3) are equipped with the measurement of model accuracy (adjusted R^2) and hypothesis testing (F-test and t-test). Measurement The appropriateness or suitability of the model (goodness of fit) is calculated by adjusted R^2. According to Gujarati (1978) and Gujarati and Porter (2009) formulated as follows:

$$\text{Adjusted } R^2 = 1 - (1 - R^2)\frac{(n-1)}{(k-1)} \quad (4)$$

where :
Adjusted R^2 : coefficient of determination adjusted
k : the number of variables not included intercept
n : number of samples

Testing the hypothesis of the regression coefficient is simultaneous with the F-test certain level of confidence, which, according to Greene (1990) and Gujarati and Porter (2009) defined as follows

$$F\ hitung = \frac{ESS/(k-1)}{RSS/(n-k)} \quad (5)$$

$$F\ tabel\ [(k-1):(n-k);\alpha] \quad (6)$$

where:
α : level of significance or specification error
By hypothesis :
H_0 : $\beta_1 = \beta_2 = ... = \beta_n = 0$, meaning that there is no influence of independent variables to-i simultaneous on the dependent variable
H_1 : at least one of independent variables $\neq 0$, meaning that there is the influence of the independent variables to-i together on the dependent variable

Tests on individual (partial) regression coefficients t-test was used with a certain confidence level. According to Greene (1990) and Gujarati and Porter (2009) with the formula:

$$t\ hitung = \frac{\beta i}{S\beta i} \quad (7)$$

$$t\ tabel\ [(n-k);\alpha/2] \quad (8)$$

β_i : regression coefficient of to-i
$S\beta_i$: standard error of regression coefficients to-i
By hypothesis:
H_0 : $\beta_i = 0$, meaning that there is no influence of independent variables to-i are partial on the dependent variable
H_1 : $\beta_i \neq 0$, meaning that there are significant independent variable to-i individual the dependent variable

4. Result

The measurement of model accuracy or the suitability of the model (goodness of fit) of adjusted value R^2 (Gujarati, 1978; Gujarati and Porter, 2009) shows independent variables on the demand function model of fresh sea fish in the form of *indian mackerel, sardinella longiceps*, and *scads mackerel* at the consumer level presented each (93.6%), and 81.6% of the variation for the demand of fresh sea fish in South Sulawesi while the remaining amounted to 6.5%, 19.4% and 18.4% Influenced by other variables not included in the model (Table 1).

Furthermore, F-test results (Greene, 1990, Gujarati and Porter, 2009) are respectively 110,144; 32.501; and 34,540 indicate that the factors influencing the demand of fresh sea fish in South Sulawesi significantly influence the error rate of 1% or 99% confidence level (Table 1). Furthermore, individual influence based on t-test (Greene, 1990, Gujarati and Porter, 2009) from each independent variable to the production of catch in marine waters of South Sulawesi using regression coefficient value.

Based on the result of regression analysis (Table 1), the value of multiple linear regression equation which is raised with econometric model of data panel of fixed effect method follows:

$$LnQdKmbng_{it} = 3.507 + 0.819\,LnPKmbng_{it} + 0.009\,LnPLmr_{it} - 0.111\,LnPLyng_{it} + 0.017\,LnPTA_{it} - 0.010\,LnIPkpt_{it} +$$

$0.706\ DmWPKB_i + 0.889 DWPKJ_i + \mu_{1it}$ (9)

$LnQdLmr_{it} = 6.468 - 0.044\ LnPLmr_{it} + 0{,}081\ LnPLyng_{it} + 0.352\ LnPKmbng_{it} + 0.166\ LnPTA_{it} + 0.170\ LnIPkpt_{it} - 0.620\ DmWPKB_i + 0.010\ DWPKJ_i + \mu_{2it}$ (10)

$LnQdLyng_{it} = -3.523 - 0.888\ LnPLyng_{it} - 0.329\ LnPLmr_{it} + 0.409\ LnPKmbng_{it} + 0.219\ LnPTA_{it} + 0.686\ LnIPkpt_{it} + 0.166\ DmWPKB_i - 0.188\ DWPKJ_i + \mu_{3it}$ (11)

From equation (9), (10) and (11) then the equation is changed again in the form of power function by anti-Ln as follows:

$QdKmbng_{it} = 33.348\ PKmbng_{it}^{0.819}\ PLmr_{it}^{0.009}\ PLyng_{it}^{-0.111}\ PTA_{it}^{0.017}\ IPkpt_{it}^{-0.010}\ DmWPKB_i^{0.706}\ DWPKJ_i^{0.889\ \mu 1it}$ (12)

$QdLmr_{it} = 644.194\ PLmr_{it}^{-0.044}\ PLyng_{it}^{0.081}\ PKmbng_{it}^{0.352}\ PTA_{it}^{0.166}\ IPkpt_{it}^{0,170}\ DmWPKB_i^{-0.620}\ DWPKJ_i^{0.010\ \mu 2it}$ (13)

$QdLyng_{it} = 0.029\ PLyng_{it}^{-0.888}\ PLmr_{it}^{-0.329}\ PKmbng_{it}^{0.409}\ PTA_{it}^{0.219}\ IPkpt_{it}^{0.686}\ DmWPKB_i^{0.166}\ DWPKJ_i^{-0.188\ \mu 3it}$ (14)

Table 1. Demand Estimation of Fresh Sea Fish with Panel Data Model in South Sulawesi, Indonesia

Indpendent Variable	ES	*Indian mackerel* Coef. (β)	*Sardinella longiceps* Coef. (β)	*Scads mackerel* Coef. (β)
PKmbng	-	0.819***	-0.044^{ns}	-0.888***
PLmr	-	0.009^{ns}	0.081^{ns}	-0.329**
PLyng	-	-0.111^{ns}	0.352**	0.409***
PTA	-	0.017^{ns}	0.166^{ns}	0.219^{ns}
Ipkt	+	-0.010^{ns}	0.170*	0.686^{ns}
DWPKB	+	0.706***	-0.620*	0.166***
DWKJt	+	0.889***	0.010^{ns}	-0.188***
Intercep		3.507***	6.468***	3.523***
F-test		110.144***	32.501***	34.540***
Adjusted R^2		0.935	0.806	0.816
n		54	54	54

*** is a level error significance of 1 % (0,01), or confidence level of 99 %. ** is a level error significance of 5 % (0,05), or confidence level 95 %. * is a level error significance of 10 % (0,10), or confidence level 95 %. ns is not significant. ES is an expectation sign

5. Disscusion

In the *indian mackerel* fish demand function, the price variables of bloated fish itself have a positive effect on the bloated demand in the South Sulawesi consumer market at 1% error rate or 99% confidence, meaning that any increase of *indian mackerel* price of Rp 1 will increase the *indian mackerel* demand by 0.819 kg. This is not in accordance with the negative sign of hope because the people of South Sulawesi in this district of Barru, Jeneponto, and Sinjai have tastes and preferences of the fish so that despite the increase in fish prices can still buy the commodity. It is also proven that the price of *sardinella longiceps* and kite did not affect the *scads mackerel* demand in South Sulawesi consumer market

This result is different from the findings of Setiadi and Irham (2003) that the demand of tuna is negatively influenced by the price of mackerel tuna itself and positively by the price of catfish in Jogjakarta Special Region. Dalhatu and Ala (2010) finds that prices negatively affect fish demand in Nigeria, while the findings of Vigantari et.al (2011) using the model of Almost Ideal Demand System (AIDS) that fish prices negatively affect the demand for fish (catch and Cultivation) in Indonesia such as the islands of Sulawesi, Maluku, and Java. Another finding of Kiziloðlu and Kizilaslan (2016) with the Logit model that fish prices have a positive effect on fish consumption in Erzurum, Turkey.

Another case of *sardinella longiceps* demand is *scads mackerel* positively influenced by the overpass price at a 5% error rate (95% confidence). This means that each increase in price of Rp 1 the *sardinella longiceps* demand also increased by 0.532 kg. This happens because the kite as a substitute commodity is very popular by the people of South Sulawesi. Furthermore, the demand for kites in the consumer market is positively influenced by the price of the fly over itself at a 1% error rate (99% confidence). According to Herath and Radampola (2016) that lower prices are the factors that govern for fish consumption in Sri Lanka

Furthermore the negative effect of the rill price of *indian mackerel* at the error rate of 1% and the price of *sardinella longiceps* at the error rate of 5%. This means that each price increase of *indian mackerel* and *sardinella longiceps* amounting to Rp 1 then the demand for flyovers also decreased by 0.888 kg and 0.329 kg respectively. This happens because of the influence of people's purchasing power in

South Sulawesi on the change of fish price (if the price of fresh marine fish increases, it will switch to cheaper price of fresh sea fish).

These findings differ in Turkey that despite rising prices of substitute commodities such as red meat and chicken meat demand for fish increases (Kiziloðlu and Kizilaslan, 2016), whereas in Poland, prices are a factor that determines their choice compared to nutritional value and Health effects (Lebiedzinska et.al. 2006).

At the price of chicken eggs as commodity substitution of fresh sea fish commodity has no significant effect on the demand of *indian mackerel*, *sardinella longiceps*, and *scads mackerel*. This happens in the field that although there is a good price increase during the famine season then the people of South Sulawesi in this case people Barru district, Jeneponto, and Sinjai still choose the sea fish. These results are in line with the findings of Setiadi and Irham (2003) in Jogjakarta that the price of chicken eggs does not affect the demand of mackerel tuna.

South Sulawesi's income per capita (Barru, Jeneponto, and Sinjai districts) positively affected the 10% (confidence 90%) error rate on *indian mackerel* demand in the consumer market. This is in line with a positive expectation sign, which means that every increase in per capita income of the people of South Sulawesi of Rp 1 will increase demand for *indian mackerel* by 0.170 kg. This happens because the price of *indian mackerel* commodity is higher than the commodities of *indian mackerel* and *scads mackerel*. In addition, the factors of taste and preference that determine the people of South Sulawesi choose the fish (*indian mackerel*). This result is in line with what Onurlubas (2013) finds about fish consumption habits or preferences in Impression Township Endirne Turkey.

Consumer behavior and attitudes are important factors in making decisions to purchase fishery products based on demographic status (Ahmed et al. 2011; Kessuvan et al. 2015) and attitudes as do households in Kuala Lumpur Malaysia (Ahmed et.al. , 2011) and socioeconomic conditions, such as consumer preferences on fish purchases in North Yola of the local government of Adamawa country (Moses et al. 2015) and consumer culture in Asia (Dey et.al. 2008), while consumer behavior and consumption habits Seafood is an important factor influencing the development of the seafood sector in many countries (Erdoğan et.al. 2011).

Further, this finding is certainly different from the findings of Setiadi and Irham (2003) that per capita income does not affect the demand of mackerel tuna in Jogjakarta, but these findings are in line with the findings of Nayga and Capps (1995) in the United States, Dey et. al. (2008) in Asia, Dalhatu and Ala (2010) in Nigeria, and Kiziloðlu and Kizilaslan (2016) in Turkey that income has a positive effect on fish consumption. According to Moses et. al. (2015) that preferences and perceptions are an essential element of demand theory but most economic analyzes for market demand are based on price and income.

Dummy regional differences (Barru regency and Jeneponto) have a significant positive effect on the 1% error rate on *indian mackerel* demand in the consumer market. This has been in line with the positive sign of hope, *sardinella longiceps* demand in the District of Barru is greater than other districts (Jeneponto). Similarly, if compared between Jeneponto and Sinjai. The demand for *sardinella longiceps* fish in Jeneponto Regency is greater than that of Sinjai District.

Another case in *sardinella longiceps* demand in the consumer market is negatively affected at a 10% error rate. This does not match the negative expectation mark. This means that demand for *sardinella longiceps* in Barru District smaller than Jeneponto district. Furthermore, the *scads mackerel* request is affected positively and negatively at a 1% error rate. In the area of Barru District, the overpass demand is greater than Jeneponto Regency. This finding is in line with Vigantari et.al. (2011) that differences in rural-urban areas are influencing fish demand in Indonesia with AIDS models, as well as fish demand in Turkey (Aydin et al. 2011).

6. Conclussion

Based on the results of the research, it is found that in general the price of sea fish itself positively and negatively affect the demand of fresh sea fish in South Sulawesi. Negative influence is the price of *indian mackerel* and

sardinella longiceps to the *scads mackerel* demand, whereas the positive is the price of the *scads mackerel* itself against the *scads mackerel* request. This is because the taste and preferences of Indonesian people, especially in South Sulawesi.

Income per capita has a positive effect on the demand of fresh sea fish due to the consumption of sea fish so the demand always increases. Regional differences have positive and negative effects on the demand of fresh marine fish, meaning that the different areas of both villages and cities affect the demand for sea fish in South Sulawesi.

Another case the price of eggs does not significantly affect the demand for fresh marine fish. This is because of the factors of consumption behavior and consumer attitudes and culture influence in the decision of the people of South Sulawesi to buy marine fishery products.

In order to increase the production of catches to meet the demand for fresh sea fish consumption in Indonesia, especially in South Sulawesi province, it is necessary to support government or stockholder in the form of increase of *Grosstonase* (GT) powered fleet, such as 50 - 100 GT to reach fishing ground in *Zone Economic Exclusive* (ZEE), such as 6 sd 12 miles away. This has been referring to the 2010 government program through the ministry of marine and fisheries, the blue revolution as a grand strategy in implementing the restructuring of the national fleet to increase the production of catches.

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